Remarks/Arguments:

Claim 7 has been amended. Claim 14 has been added. No new material is introduced herein. Claims 7-14 are pending.

The abstract has been objected as including over 150 words. The abstract has been amended accordingly. Applicants respectfully request that the objection to the abstract be withdrawn.

Figs. 6A-6D have been objected to as lacking a Prior Art legend. Figs. 6A-6D have been amended accordingly. Applicants respectfully request that the objection to the figures be withdrawn.

Claims 7-13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Ono (U.S. Pat. No. 5,737,351). It is respectfully submitted, however, that these claims are now patentable over the cited art for the reasons set forth below.

Claim 7, as amended, includes features neither disclosed nor suggested by the cited art, namely:

> ...disordering the active layer by <u>diffusing an impurity at least through the impurity supply control layer</u> at least in a predetermined region within the semiconductor multilayer structure... (Emphasis Added)

These features are disclosed, for example, on p. 13, lines 3-26; and Figs. 2A-2D.

Ono discloses a semiconductor laser, in Fig. 1, that includes a cap layer 11 which forms part of the ridge structure 16 (Col. 6, lines 23-25). As shown in Figs. 3(b) and 3(c), Zn from ZnO layer 13 is diffused in areas where <u>cap layer 11 is removed</u> (Col. 6, line 65-Col. 7, line 5). Ono does not disclose or suggest Applicants claimed features of "...disordering the active layer by <u>diffusing an impurity at least through the impurity supply control layer</u> at least in a predetermined region within the semiconductor multilayer structure..." (emphasis added). These features are neither disclosed nor suggested by Ono. Ono discloses diffusing the impurity in regions where the cap layer is removed. Thus, Ono does not include all of the features of amended claim 7.

Applicants claimed invention provides an advantage in that the concentration of the impurity can be controlled to a low concentration, less than or equal to 2×10^{18} cm^{-3}, by diffusing the impurity through the impurity supply control layer 208, shown in Applicants Figs. 2A-2D, for example. As described on p. 17, line 22 through p. 19, line 11, this causes a low enough impurity concentration to reach the etching stop layer 205 such that the etching stop layer may be retained in the impurity diffusion regions 211 during the process of ridge formation. The etching rate tends to become higher in the impurity diffusion regions 211 than

in the remainder of the structure. Thus, if the impurity concentration is not maintained at a low concentration, there is a possibility that the etching stop layer may be deformed or completely removed in the impurity diffusion regions. Thus the current blocking layer 213 may be formed near the active layer 203, causing a propagation loss due to carrier scattering. In applicants claimed invention, the impurity supply control layer controls the concentration of the impurity diffused through the layers of the semiconductor structure such that a low concentration is diffused. Thus the present invention may reduce the potential for propagation loss due to carrier scattering. Ono does not disclose or suggest controlling the impurity concentration that is diffused through the cap layer. Thus, applicants claim 7 provides an advantage over Ono. Accordingly, allowance of claim 7 is respectfully requested.

Claims 8-13 include all of the features of claim 7 from which they depend. Accordingly, claims 8-13 are also patentable over the cited art.

Claim 14 has been added. Claim 14 recites that the impurity supply control layer is removed after the impurity is diffused and that the second cladding layer of the second conductivity type is patterned into a ridge structure by wet etching. No new matter is introduced herein. These features are disclosed, for example, on p. 17, lines 5-20. New claim 14 includes the features of amended claim 7 from which it depends. Accordingly, claim 14 is patentable over the cited art.

After the impurity is diffused through the impurity supply control layer, the impurity diffusion regions have a higher etching rate as compared with the portions of the structure due to the higher impurity concentration in these regions. Thus during ridge structure formation, if the etching rates are higher in the impurity diffusion regions, it is possible that the impurity supply control layer may cause a pattern deformation of the ridge structure due to the variable etching rates in different portions of the semiconductor structure. However, as disclosed in claim 14, the impurity supply control layer is removed after the impurity is diffused. Therefore, pattern deformation may be prevented. In Ono, however, the cap layer is not removed. Instead the cap layer is disclosed to be part of the ridge structure 16. Thus, the semiconductor laser of Ono may be prone to pattern deformation in areas where the impurity is diffused in the cap layer. Thus, the present invention, as disclosed in claim 14, provides advantages over the cited art.

In a semiconductor laser device, current flows to an active layer through the ridge structure. If the crystallinity of a current path is reduced and/or if a defect is present, this may increase a resistance and cause a characteristic reduction of the semiconductor laser device, such as a reduction of output power and an increase in operating current by the semiconductor

laser device. After the impurity is diffused, the impurity concentration at a surface of the impurity supply control layer may become high. For example, p. 14, line 22-p. 15, line 5 and Fig. 3 of Applicants disclosure show an example where the impurity concentration at the surface of the impurity supply control layer reaches an order of 10^{19} cm^{-3}. Because of the high impurity concentration, crystallinity of the impurity supply control layer may decrease. Furthermore, if a layer is formed, such as via crystal growth, on the impurity supply control layer, the crystallinity of this layer may decrease. There is also the possibility that a defect may occur in the impurity supply control layer when the impurity is diffused, thereby reducing the crystallinity of the impurity supply control layer. As discussed above, these conditions may cause a characteristic reduction of the semiconductor laser device. However, according to the present invention as disclosed in claim 14, the impurity supply control layer is removed after diffusion. Thus, the characteristic reduction may be prevented. In Ono, however, the cap layer is not removed. Instead the cap layer is disclosed to be part of the ridge structure 16. Thus the semiconductor laser of Ono may be prone to characteristic reduction of the semiconductor laser device. Thus, the present invention, as disclosed in claim 14, provides advantages over the cited art.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,

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AR/DG/jal
Attachments: Figures 6A - 6D (1 sheet)
Abstract

Dated: December 13, 2005

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The Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. **18-0350** of any fees associated with this communication.

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DECEMBER 13, 2005

Deborah Spratt Deborah Spratt

Amendments to the Drawings:

The attached sheet of drawings include changes to Figures 6A through 6D. This sheet replaces the original sheet.

Attachment